A process for the manufacturing of a thermosetting laminate.

The present invention relates to a process for the manufacturing of a decorative thermosetting laminate with a damping layer intended to decrease the sound-level.

Products coated with thermosetting laminate are common nowadays. They are foremost used where the demands on abrasion resistance are great, but also where resistance towards different chemicals and moisture are demanded. As example of such products can be mentioned floors, floor beadings, work tops, desk tops and wall panels.

The thermosetting laminate most often consists of a number of base sheets with decor sheet arranged closest to the surface. The decor sheet can be provided with a desired decor or pattern. Such laminates are very hard in order to withstand the wear they are exposed to. This will unfortunately lead to a high noise level when hard objects are retarded suddenly by the laminate surface, such as hard heels towards a laminate surface.

It is desirable to be able to muffle the sound level in locales with a floor surface of laminate, specially in locales where shoes normally are used.

It has, through the present invention, been made possible to meet the above mentioned desires and a thermosetting laminate with a lower noise level has been achieved. Accordingly, the invention relates to a process for the manufacturing of a decorative laminate. The laminate comprises an upper decorative and abrasion resistant thermosetting laminate layer and a carrying core. The invention is characterised in that the upper side of the core is provided with the abrasion resistant thermosetting laminate and that the lower side of the core is provided with a balance layer. The balance layer have the purpose of preventing warping of said decorative laminate and is at the same time having the purpose of acoustic dampening. The balance layer comprises a layer of a polymer, whereby said balance layer and said thermosetting laminate are joined with said core by means

of pressing. Said carrying core further is provided with a dampening foil of an elastomer arranged between the upper side of the core and the abrasion resistant thermosetting laminate which elastomer and which thermosetting laminate are joined with each other and with the core by means of pressing. The achieved laminate is then cut into panels and provided with edges intended for joining.

The thermosetting laminate is preferably constituted by one or more decor papers impregnated with melamine-formaldehyde resin and one or more overlay sheets impregnated with melamine formaldehyde resin arranged on top of the decor papers. The thermosetting laminate may further possibly constitute one or more conventional resin impregnated underlay papers, arranged under the decor paper or decor papers, which underlay papers preferably contains phenol-formaldehyde resin. The different papers are laminated together under increased pressure and increased temperature. At least one of the sheets impregnated with thermosetting resin, preferably the outermost, is provided with hard particles of for example silicon oxide, aluminium oxide and/or silicon carbide with an average size of 1 -100 μm, preferably around 5 - 60 μm. The thermosetting laminate suitably has a thickness in the range 0.1 mm - 1.2 mm, preferably 0.3 mm - 0.9 mm and a density in the range 1250 - 1500 kg / m^3.

The carrying core is suitably constituted of a particle board, a fibre board or an oriented strand board. It is also possible to use a board based on polymers such as polyurethane or a fibre cement board. A polymer based board may further comprise fibre and particles.

The balance layer is suitably constituted of a thermoplastic elastomer. The balance layer suitably has elasticity compression coefficient in the range 0.5 - 2.7 Mpa, preferably 0.8 - 2.0 Mpa as measured according to ISO 3386-1 with supplement from ISO 7214. The balance layer preferably has a thickness in the range 0.1 - 5 mm, preferably 0.2 - 1 mm. The balance layer is suitably constituted of an expanded physically cross-linked polyolefin with closed cells and suitably has a density in the range 50 - 400 kg/m^3, preferably 80 - 330 kg/m^3.

The balance layer may also be constituted by massive rubber with a thickness in the range 0.1 - 5 mm.

According to another embodiment of the invention the balance sheet is constituted by a non-woven fibre arranged on a polyolefin foil. The non-woven fibre is suitably constituted by polypropylene, polyester, viscose or the like while the polyolefin foil suitably is constituted of polyethylene. The balance layer suitably has an unloaded average thickness in the range 0.3 - 5 mm and an unloaded density in the range 150 - 800 kg/m^3.

According to one embodiment of the invention the balance sheet may be constituted of recycled and processed packaging material containing cellulose, polyethylene and possibly aluminum. The major portion of polyethelene is present in the form of low density polyethylene and only small amounts of high density polyethylene may be present. From this material a sheet or foil with a thickness of 0.5 - 5 mm is manufactured. The sheet or foil is constituted of 2 - 30 % by weight of cellulose 0 - 20 % of aluminum and the main remaining portion polyethylene. The sheet or foil may also be expanded by any known means to a density in the range 500 - 950 kg/ m^3.

According to one embodiment of the invention the balance sheet further comprises a conductive material. The purpose of this conductive material is to reduce the risk for build-up of static charges. The conductive material may be constituted of carbon black, carbon fibre or even of particulate aluminum. It is also possible to use a conductive material which is constituted of a vacuum metallized layer. Such a metallized layer is then suitably constituted of aluminium. The conductivity is preferably better than 500kΩcm.

The balance layer and the thermosetting laminate is suitably joined with the carrying core by means of a bonding agent and pressure. The bonding agent can hereby be constituted by a water-soluble standard glue or a so-called melt-glue. In the latter case the balance layer, the carrying core and the thermosetting laminate

joined via heat and pressure. It is also possible to let the balance layer itself work as a melt-glue layer. The balance layer is then suitably non-expanded and will then have a density in the range 400 - 900 kg/m³.

An alternative to having conductive materials in the balance sheet it is also possible to use a glue which comprises a conductive material. This glue may then contain a conductive material which is constituted of carbon black or of carbon fibre. Also here the conductivity is suitably better than 500kΩcm.

As discussed above the thermosetting laminate has a thickness in the range 0.1 mm - 1.2 mm, preferably 0.3 mm - 0.9 mm while the thermosetting laminate has a density in the range 1250 - 1500 kg / m³. The dampening foil between this thermosetting laminate and the carrying core is suitably constituted of a thermoplastic elastomer. The dampening foil suitably has elasticity compression coefficient in the range 0.5 - 2.7 Mpa, preferably 0.8 - 2.0 Mpa, as measured according to ISO 3386-1 with supplement from ISO 7214, and a thickness in the range 0.1 - 0.7 mm, preferably 0.1 - 0.5 mm. The dampening foil is preferably constituted of an expanded physically cross-linked polyolefin with closed cells and has a density in the range 150 - 400 kg/m³, most preferably 180 - 330 kg/m³. Also the dampening foil may contain a conductive material which is constituted of carbon black or of carbon fibre. Also here the conductivity is suitably better than 500kΩcm.

The dampening foil and the thermosetting laminate is suitably joined with the carrying core by means of glue and pressure.

According to one embodiment of the invention also the dampening foil comprises a conductive material. The purpose of this conductive material is to further reduce the risk for build-up of static charges. The conductive material may be constituted of carbon black or of carbon fibre. It is also possible to use a conductive material which is constituted of a vacuum metallized layer. Such a metallized layer is then suitably constituted of aluminium. The conductivity is preferably better than 500kΩcm.